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B8A

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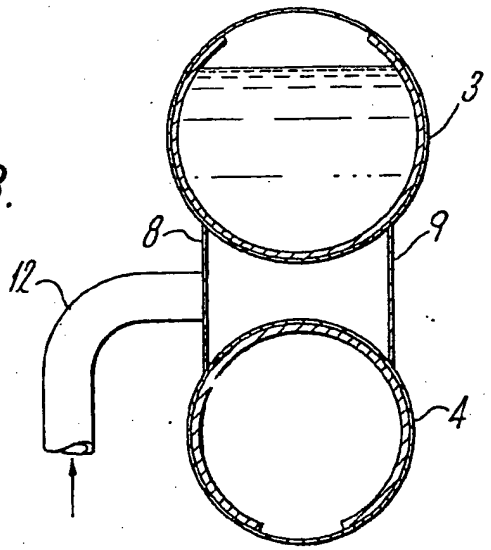
(54) Conveyor belt constrained to an arcuate form within a tube

(57) An endless belt conveyor, in its passage from a loading station to a discharge station, passes through a tube 3, curving downwardly between its edges to a shape to which it is constrained by the tube. To facilitate the movement of the belt through the tube, air from a chamber 8, 9 is maintained between the belt and the tube.

Fig.3.



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The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

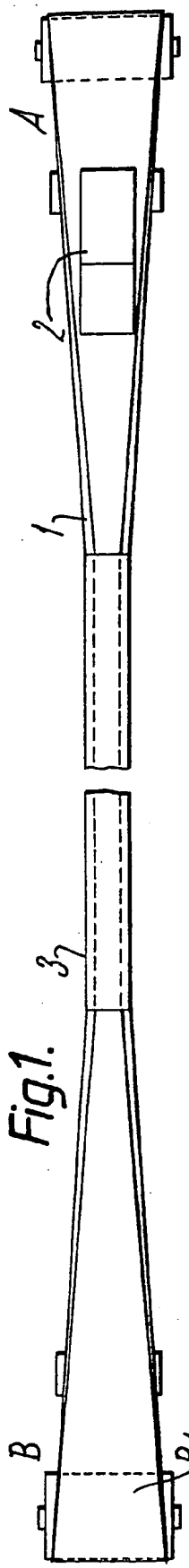

Fig.1.

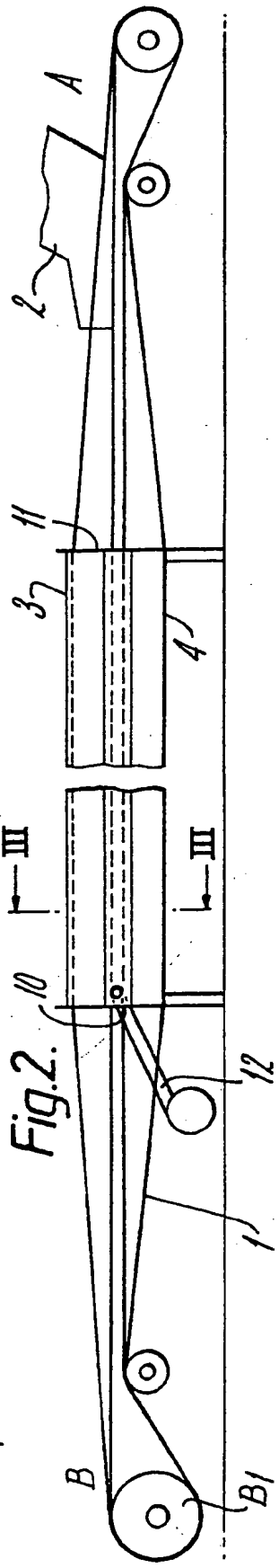

Fig.2.

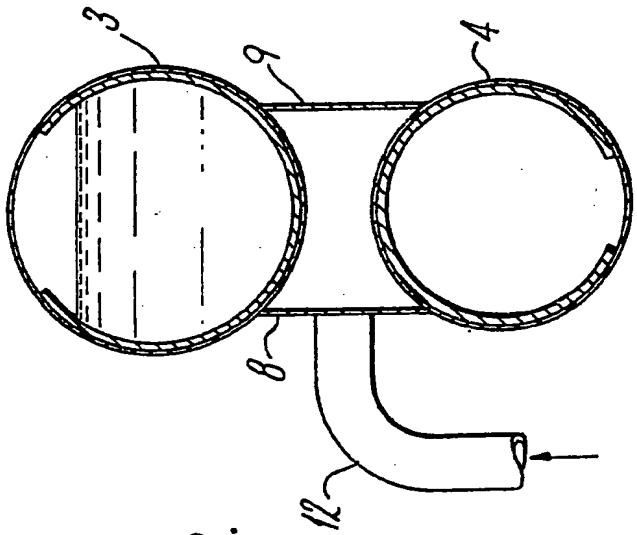

Fig.3.

SPECIFICATION

Improvements in or relating to endless belt conveyors

This invention is concerned with belt conveyors and arose from a consideration of ways of combating spillage and the raising of dust during the passage of a conveyor carrying granular material from a loading station to a discharge station.

According to the present invention, there is provided an endless belt conveyor that passes through a loading station and a discharge station and, between the former and the latter, extends longitudinally within a cylindrical tube by which the belt is constrained to occupy, in any normal transverse cross-section, an arc with both edges of the belt lying at the top of the arc and above the horizontal diameter of the tube, and means to maintain air between the belt and the inside of the tube to facilitate movement of the belt longitudinally within the tube.

An embodiment of the invention, which will be described by way of example, is illustrated somewhat schematically in the accompanying drawings in which

Figure 1 indicates a plan view of an endless belt conveyor system;

Figure 2 indicates that system in side views; and

Figure 3 indicates a section on the line III—III of Figure 2.

The conveyor system shown in the figures includes an endless belt 1 by which granular material may be conveyed from a loading station A, at which there is a chute 2 through which material can be fed to the belt 1, to a discharge station B at which material drops from the belt to a receiver (not shown). For most of its conveying run, the belt moves axially within a cylindrical tube 3 whilst for most of its return run, the belt moves axially within a cylindrical tube 4.

Within the tube 3, the belt is constrained by the tube to lie within an arc, with the upper edge of the belt lying in a plane parallel to, and above, the diametrical plane of the tube 3. The belt extends through more than three-quarters of the inner circumference of the tube 3. Between the loading station A and the entrance end of the tube 3 are groups of rollers or plastic slides (not shown) by which the belt is coaxed towards the contour that it occupies in the tube 3. Between the outlet end of the tube 3 and the discharge station B there are provided other rollers or slides (not shown) to ease the belt back towards the contour that it occupies in passing over the end roller B1.

Further rollers or slides (not shown) are provided to coax the belt into, and ease it out of, the tube 4. The diameter of the tube 4 is rather less than that of the tube 3 so that the separation between the edges of the belt in its travel through the tube 4 is less. In the tube 4, the belt is inverted so that the belt occupies an arc extending above the edges of the belt.

To facilitate the movement of the belt through tubes 3 and 4 air is introduced to form a cushion that reduces frictional contact between the belt and the tubes. To this purpose, side plates 8 and 9 and end plates 10 and 11 are fixed at their edges to the tubes 3 and 4 to form an air chamber extending for the length of the tubes and of which the boundaries are completed by parts of the tubes themselves. Openings (not shown) in those parts of the tubes are distributed along the lengths of the tubes and a duct 12 is provided through which air under pressure can be supplied to the air chamber.

In a modification of what has been described, the air chamber may be divided longitudinally into an upper part and a lower part by a horizontal dividing wall. The two parts may then be supplied separately with air at different pressures.

In the operation of the apparatus that has been described, air is supplied under pressure to the air chamber (or chambers) from which it will escape through the openings to form a layer that reduces friction between the belt and the tubes within which the belt moves. A further effect of the air pressure is that it will exert a gripping effect on the material being carried by the belt, and thus is an advantage that is especially valuable if the tube 3 is not horizontal but steeply inclined.

By shaping the belt in the lower tube to form almost a circle that is inverted, the air is introduced to the clean side of the belt and any material falling from the dirty side is carried or swept along the bottom of the tube 4.

The particular construction chosen for the air chamber (or chambers) is such as to strengthen the tubes without using additional space or supports.

In the apparatus that has been described, the tube 3 is of a larger diameter than the tube 4. In a modification, the tubes may be of the same diameter, and the diameter may be such that in the tube 3, the edges of the belt are more-or-less contiguous.

CLAIMS

1. An endless belt conveyor that passes through a loading station and a discharge station and, between the former and the latter, extends longitudinally within a cylindrical tube by which the belt is constrained to occupy, in any normal tranverse cross-section, an arc with both edges of the belt lying at the top of the arc and above the horizontal diameter of the tubes, and means to maintain air between the belt and the inside of the tube to facilitate movement of the belt longitudinally within the tube.

2. An endless belt conveyor as claimed in claim 1 in which, between the discharge and the loading stations, the belt extends longitudinally within a cylindrical tube by which the belt is constrained to occupy, in any normal transverse cross-section, an arc with both edges of the belt lying at the bottom of the arc, and means to maintain air between the belt and the inside of the tube to facilitate movement of the belt longitudinally within the tube.

3. An endless belt conveyor as claimed in either the preceding claims in which the, or each, tube the belt extends through at least three-quarters of the inner circumference of the tube.

4. An endless belt conveyor as claimed in any of the preceding claims in which the means to maintain air between the belt and the, or a, tube through which it moves includes an air chamber to which air may be supplied under pressure, lying externally of the tube, and of which part of the boundaries is provided by the tube, and openings in the tube leading from the air chamber to the interior of the tube distributed lengthwise of the tube.

5. An endless belt conveyor as claimed in claim 4 when appendent to claim 2 or claim 3 when appendent to claim 2 in which the tubes lie one above the other and the air chambers are connected to each other with the space in one chamber separated from the space in the other by a common dividing wall.

6. An endless belt conveyor as claimed in claim 4 when appendent to claim 2 or to claim 3 when appendent to claim 2 in which the tubes lie one above the other and there is a single air chamber common to both tubes with part of the boundaries of the air chamber being provided by each of the tubes.

7. An endless belt conveyor as claimed in claim 2 or any of claims 3 to 6 when appendent to claim 2 in which the lower tube has a diameter less than that of the upper tube.

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